Water Quality Assessment
Woods Creek
Mount Crested Butte Water & Sanitation District, Mt. Crested Butte WWTF

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I. Water Quality Assessment Summary

Table A-1 includes summary information related to this WQA. This summary table includes key regulatory starting points used in development of the WQA such as: receiving stream information; threatened and endangered species; 303(d) and Monitoring and Evaluation listings; low flow and facility flow summaries; and a list of parameters evaluated.

Table A-1
WQA Summary

Facility Information

Facility Name	Permit Number	Design Flow (max 30-day ave, MGD)	Design Flow (max 30-day ave, CFS)
Mt. Crested Butte WWTF	CO0027171	1.2	1.9

Receiving Stream Information

Receiving Stream Name	Segment ID	Designation	Classification(s)
S1. Woods Creek*	COGUUG13	Undesignated	Aquatic Life Cold 2 Recreation Class E Agriculture Water Supply
S2. Washington Gulch*	COGUUG09	Undesignated	Cold Water Aquatic Life Class 1 Recreation E Agriculture Water Supply

Low Flows (cfs)

Receiving Stream Name	1E3 (1-day)	7E3 (7-day)	30E3 (30-day)	Ratio of 30E3 to the Design Flow (cfs)
S1. Woods Creek	0.07	0.07	0.07	F1: 0.04:1
S2. Washington Gulch	0.03	0.03	0.03	F1: 0.02:1

Regulatory Information

T&E Species	303(d) (Reg 93)	Monitor and Eval (Reg 93)	Existing TMDL	Temporary Modification(s)	Control Regulation
No	Cd & Zn for COGUUG08	None	No	None	Reg 39 Salinity Regulations

Pollutants Evaluated

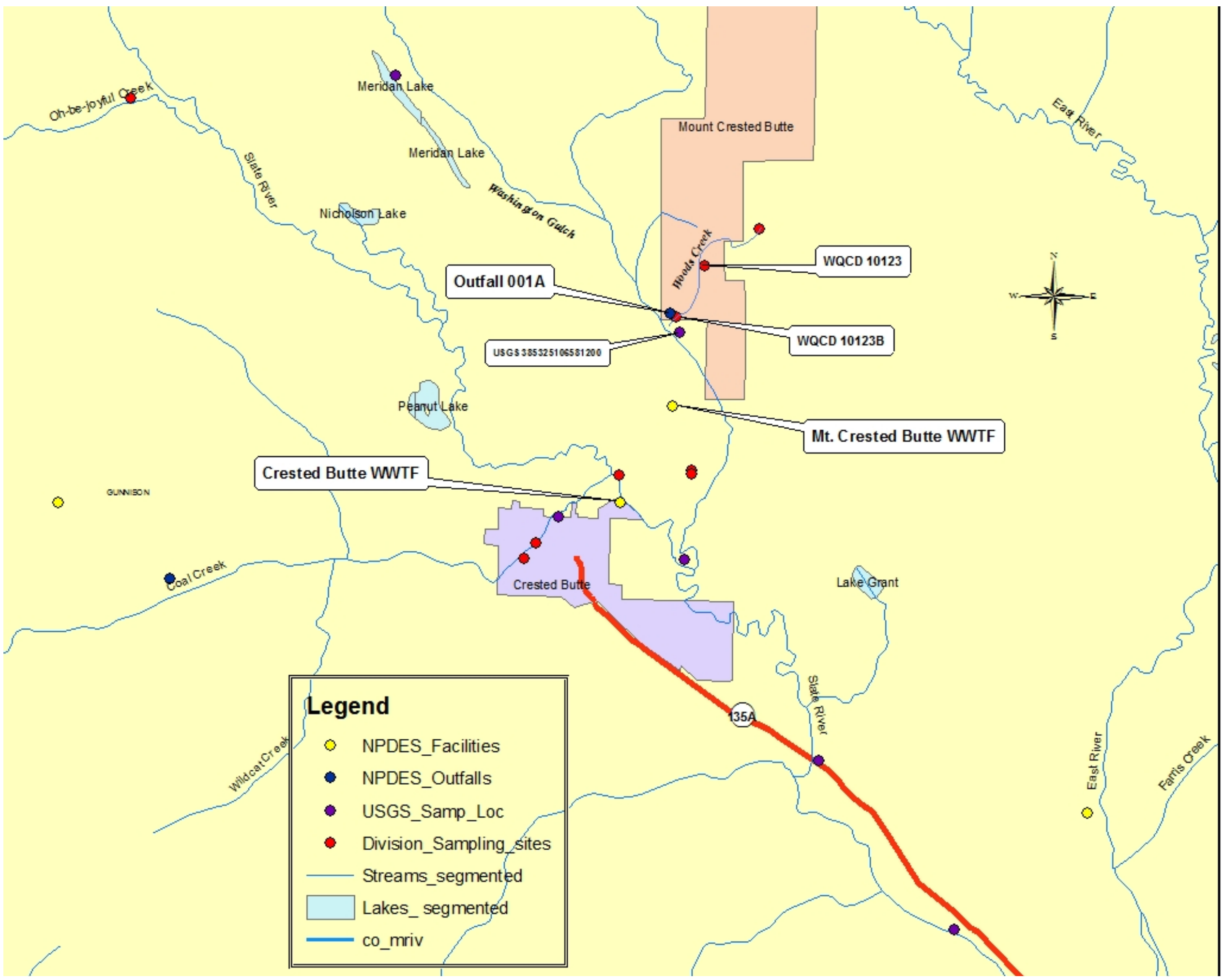
Ammonia, *E. Coli*, TRC, Metals & Cyanide, Temperature, & pH

*Combination of the standards for these segments is also protective of the standards for COGUUG08 which is 1.5 mile downstream from the confluence of Woods Creek and Washington Gulch

II. Introduction

The water quality assessment (WQA) of Woods Creek and Washington Gulch near the Mt. Crested Butte Wastewater Treatment Facility (WWTF), located in Gunnison County, is intended to determine the assimilative capacities available for pollutants found to be of concern. This WQA describes how the water quality based effluent limits (WQBELs) are developed. These parameters may or may not appear in the permit with limitations or monitoring requirements, subject to other determinations such as reasonable potential analysis, evaluation of federal effluent limitation guidelines, implementation of state-based technology based limits, mixing zone analyses, 303(d) listings, threatened and endangered species listing, or other requirements as discussed in the permit factsheet. Figure A-1 contains a map of the study area evaluated as part of this WQA.

FIGURE A-1



The Mt. Crested Butte Sanitation District Wastewater Treatment Facility (Mt. Crested Butte WWTF) discharges to Woods Creek, which is stream segment COGUUG13. This means the Gunnison and Lower Dolores River Basin, Upper Gunison Sub-basin, Stream Segment 13. This segment is composed of the "Mainstem of Woods Creek from the source to the confluence with Washington Gulch." Stream segment COGUUG13 is classified for Aquatic Life Cold 2, Recreation Class E, Water Supply and Agriculture.

Woods Creek flows approximately 200 yards into Washington Gulch. Due to its proximity to the discharge, Washington Gulch, which is stream segment COGUUG09, was also evaluated. This means the Gunnison and Lower Dolores River Basin, Upper Gunnison Sub-basin, Stream Segment 09. This segment is composed of the "All tributaries, and wetlands, to the Slate River except for specific listings in Segments 1, 10a, 10b, 11, 12 and 13.". Stream segment COGUUG09 is classified for Cold Water Aquatic Life Class 1, Recreation E, Water Supply and Agriculture.

The Washington Gulch, from the confluence of the Woods Creek, flows approximately 1.5 miles to the Slate River. The stream segment associated with the Slate River, COGUUG08, is currently listed in the Colorado's 303(d) list of water quality impacted streams for cadmium and zinc. Note that stream segment COGUUG08 has the same stream standards as COGUUG09, except for molybdenum which has a site specific molybdenum limitation of 160ug/l as compared to that of 210 µg/l for COGUUG09. Therefore all the limitations calculated for COGUUG09 will also be protective for COGUUG08, except for molybdenum. However, it will be regulated by the molybdenum limitation for COGUUG13.

Information used in this assessment includes data gathered from the Mt. Crested Butte SD, the Division, the Colorado Division of Water Resources (DWR), Riverwatch, the U.S. Environmental Protection Agency (EPA), the U.S. Geological Survey (USGS), and communications with the local water commissioner. The data used in the assessment consist of the best information available at the time of preparation of this WQA analysis.

III. Water Quality Standards

<u>Narrative Standards</u>

Narrative Statewide Basic Standards have been developed in Section 31.11(1) of the regulations, and apply to any pollutant of concern, even where there is no numeric standard for that pollutant. Waters of the state shall be free from substances attributable to human-caused point source or nonpoint source discharges in amounts, concentrations or combinations which:

for all surface waters except wetlands;

(i) can settle to form bottom deposits detrimental to the beneficial uses. Depositions are stream bottom buildup of materials which include but are not limited to anaerobic sludge, mine slurry or tailings, silt, or mud; or (ii) form floating debris, scum, or other surface materials sufficient to harm existing beneficial uses; or (iii) produce color, odor, or other conditions in such a degree as to create a nuisance or harm existing beneficial uses or impart any undesirable taste to significant edible aquatic species or to the water; or (iv) are harmful to the beneficial uses or toxic to humans, animals, plants, or aquatic life; or (v) produce a predominance of undesirable aquatic life; or (vi) cause a film on the surface or produce a deposit on shorelines; and

for surface waters in wetlands;

(i) produce color, odor, changes in pH, or other conditions in such a degree as to create a nuisance or harm water quality dependent functions or impart any undesirable taste to significant edible aquatic species of the wetland; or (ii) are toxic to humans, animals, plants, or aquatic life of the wetland.

In order to protect the Basic Standards in waters of the state, effluent limitations and/or monitoring requirements for any parameter of concern could be put in CDPS discharge permits.

Standards for Organic Parameters and Radionuclides

Radionuclides: Statewide Basic Standards have been developed in Section 31.11(2) and (3) of The Basic Standards and Methodologies for Surface Water to protect the waters of the state from radionuclides and organic chemicals.

In no case shall radioactive materials in surface waters be increased by any cause attributable to municipal, industrial, or agricultural practices or discharges to as to exceed the following levels, unless alternative site-specific standards have been adopted. Standards for radionuclides are shown in Table A-2.

Table A-2
Radionuclide Standards

Parameter	Picocuries per Liter
Americium 241*	0.15
Cesium 134	80
Plutonium 239, and 240*	0.15
Radium 226 and 228*	5
Strontium 90*	8
Thorium 230 and 232*	60
Tritium	20,000

*Radionuclide samples for these materials should be analyzed using unfiltered (total) samples. These Human Health based standards are 30-day average values for both plutonium and americium.

Organics: The organic pollutant standards contained in the Basic Standards for Organic Chemicals Table are applicable to all surface waters of the state for the corresponding use classifications, unless alternative site-specific standards have been adopted. These standards have been adopted as “interim standards” and will remain in effect until alternative permanent standards are adopted by the Commission. These interim standards shall not be considered final or permanent standards subject to antibacksliding or downgrading restrictions. Although not reproduced in this WQA, the specific standards for organic chemicals can be found in Regulation 31.11(3).

In order to protect the Basic Standards in waters of the state, effluent limitations and/or monitoring requirements for radionuclides, organics, or any other parameter of concern could be put in CDPS discharge permits.

The aquatic life standards for organics apply to all stream segments that are classified for aquatic life. The water supply standards apply only to those segments that are classified for water supply. The water + fish standards apply to those segments that have a Class 1 aquatic life and a water supply classification. The fish ingestion standards apply to Class 1 aquatic life segments that do not have a water supply designation. The water + fish and the fish ingestion standards may also apply to Class 2 aquatic life segments, where the Water Quality Control Commission has made such determination.

Because the Woods Creek is classified for Aquatic Life Cold 2, with a water supply designation, and a water + fish designation by the WQCC, the water + fish and aquatic life standards apply to this discharge.

Also since the Washington Gulch is classified for Aquatic Life Cold 1, with a water supply designation, water + fish, and aquatic life standards apply to the discharge.

Salinity

Regulation 61.8(2)(l) contains requirements regarding salinity for any discharges to the Colorado River Watershed. For industrial dischargers and for the discharge of intercepted groundwater, this is a no-salt discharge requirement. However, the regulation states that this requirement may be waived where the salt load reaching the mainstem of the Colorado River is less than 1 ton per day, or less than 350 tons per year. The Division may permit the discharge of salt upon a satisfactory demonstration that it is not practicable to prevent the discharge of all salt. See Regulation 61.8(2)(l)(i)(A)(1) for industrial discharges and 61.8(2)(l)(iii) for discharges of intercepted groundwater for more information regarding this demonstration.

For municipal dischargers, an incremental increase of 400 mg/l above the flow weighted averaged salinity of the intake water supply is allowed. This may be waived where the salt load reaching the mainstem of the Colorado River is less than 1 ton per day, or less than 366 tons per year. The Division may permit the discharge of salt in excess of the 400 mg/l incremental increase, upon a satisfactory demonstration that it is not practicable to attain this limit. See Regulation 61.8(2)(l)(vi)(A)(1) for more information regarding this demonstration.

In addition, the Division's policy, Implementing Narrative Standards in Discharge Permits for the Protection of Irrigated Crops, may be applied to discharges where an agricultural water intake exists downstream of a discharge point. Limitations for electrical conductivity and sodium absorption ratio may be applied in accordance with this policy.

Temperature

Temperature shall maintain a normal pattern of diurnal and seasonal fluctuations with no abrupt changes and shall have no increase in temperature of a magnitude, rate, and duration deemed deleterious to the resident aquatic life. This standard shall not be interpreted or applied in a manner inconsistent with section 25-8-104, C.R.S.

Segment Specific Numeric Standards

Numeric standards are developed on a basin-specific basis and are adopted for particular stream segments by the Water Quality Control Commission. The standards in Table A-3a and A-3b have been assigned to stream segment COGUUG13 and COGUUG09 in accordance with the *Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins*. Additionally, the parameters in Table A-3c are also being evaluated as they are parameters of concern for this facility type. These parameters are being included based on the numeric standards in Regulation 31.

The Water Quality Control Commission has recently completed a final action concerning the *Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins*. The changes are not expected to impact this discharge with the exception of standards for temperature as discussed below.

An amendment to the *Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins* that became effective on March 30, 2013, has changed the applicable standards for stream segment COGUUG13 and COGUUG09. This WQA has been developed in conformance with the water quality standards that became effective on March 30, 2013, as any permitting action based on this WQA would take effect after the effective date of this regulation.

Changes to segment 09 include: change of the segment description to exclude lakes and reservoirs; addition of Cold Stream tier I temperature standards; addition of a chronic TVS chromium III standard; addition of a chronic total recoverable molybdenum standard of 210 µg/l; update to the acute and chronic zinc table value standards.

Changes to segment 13 include: combining of segments 13a and 13b; addition of Cold Stream tier I temperature standards; addition of an acute total recoverable chromium III standard of 50 µg/l; delete acute chromium III TVS; addition of a chronic total recoverable molybdenum standard of 160 µg/l; update the acute and chronic zinc table value standards.

Table A-3a **In-stream Standards for Stream Segment COGUUG13**
Physical and Biological
Dissolved Oxygen (DO) = 6 mg/l, minimum
pH = 6.5 - 9 su
E. coli chronic = 126 colonies/100 ml
Temperature June-Sept = 17° C MWAT and 21.7° C DM
Temperature Oct-May = 9° C MWAT and 13° C DM
Inorganic
Total Ammonia acute and chronic = TVS
Chlorine acute = 0.019 mg/l
Chlorine chronic = 0.011 mg/l
Free Cyanide acute = 0.005 mg/l
Sulfide chronic = 0.002 mg/l
Boron chronic = 0.75 mg/l
Nitrite acute = 0.05 mg/l
Nitrate acute = 10 mg/l
Chloride chronic = 250 mg/l
Sulfate chronic = For WS, the greater of ambient water quality as of January 1, 2000 or 250 mg/l
Metals
Dissolved Arsenic acute = 340 µg/l
Total Recoverable Arsenic chronic = 0.02 µg/l
Dissolved Cadmium acute for trout and Dissolved Cadmium chronic = TVS
Total Recoverable Trivalent Chromium acute = 50 µg/l
Dissolved Trivalent Chromium chronic = TVS
Dissolved Hexavalent Chromium acute and chronic = TVS
Dissolved Copper acute and chronic = TVS
Dissolved Iron chronic = For WS, the greater of ambient water quality as of January 1, 2000, or 300 µg/l
Total Recoverable Iron chronic = 1000 µg/l
Dissolved Lead acute and chronic = TVS
Dissolved Manganese chronic = For WS, the greater of ambient water quality as of January 1, 2000, or 50 µg/l
Dissolved Manganese acute and chronic = TVS
Total Recoverable Molybdenum chronic = 160 µg/l
Total Mercury chronic = 0.01 µg/l
Dissolved Nickel acute and chronic = TVS
Dissolved Selenium acute and chronic = TVS
Dissolved Silver acute and Dissolved Silver chronic for trout = TVS
Dissolved Zinc acute and chronic = TVS

Table A-3b In-stream Standards for Stream Segment COGUUG09
Physical and Biological
Dissolved Oxygen (DO) = 6 mg/l, minimum
pH = 6.5 - 9 su
E. coli chronic = 126 colonies/100 ml
Temperature June-Sept = 17° C MWAT and 21.7° C DM
Temperature Oct-May = 9° C MWAT and 13° C DM
Inorganic
Total Ammonia acute and chronic = TVS
Chlorine acute = 0.019 mg/l
Chlorine chronic = 0.011 mg/l
Free Cyanide acute = 0.005 mg/l
Sulfide chronic = 0.002 mg/l
Boron chronic = 0.75 mg/l
Nitrite acute = 0.05 mg/l
Nitrate acute = 10 mg/l
Chloride chronic = 250 mg/l
Sulfate chronic = For WS, the greater of ambient water quality as of January 1, 2000 or 250 mg/l
Metals
Dissolved Arsenic acute = 340 µg/l
Total Recoverable Arsenic chronic = 0.02 µg/l
Dissolved Cadmium acute for trout and Dissolved Cadmium chronic = TVS
Total Recoverable Trivalent Chromium acute = 50 µg/l
Dissolved Trivalent Chromium chronic = TVS
Dissolved Hexavalent Chromium acute and chronic = TVS
Dissolved Copper acute and chronic = TVS
Dissolved Iron chronic = For WS, the greater of ambient water quality as of January 1, 2000, or 300 µg/l
Total Recoverable Iron chronic = 1000 µg/l
Dissolved Lead acute and chronic = TVS
Dissolved Manganese chronic = For WS, the greater of ambient water quality as of January 1, 2000, or 50 µg/l
Dissolved Manganese acute and chronic = TVS
Total Recoverable Molybdenum chronic = 210 µg/l
Total Mercury chronic = 0.01 µg/l
Dissolved Nickel acute and chronic = TVS
Dissolved Selenium acute and chronic = TVS
Dissolved Silver acute and Dissolved Silver chronic for trout = TVS
Dissolved Zinc acute and chronic = TVS

Table A-3c Additional Standards Being Evaluated Based on Regulation 31
Additional Parameters Being Considered in This WQA, Based on Regulation 31
Nonylphenol acute = 28 µg/l
Nonylphenol chronic = 6.6 µg/l

Table Value Standards and Hardness Calculations

Standards for metals are generally shown in the regulations as Table Value Standards (TVS), and these often must be derived from equations that depend on the receiving stream hardness or species of fish present; for ammonia, standards are discussed further in Section IV of this WQA. The Classification and Numeric Standards documents for each basin include a specification for appropriate hardness values to be used. Specifically, the regulations state that:

> The hardness values used in calculating the appropriate metal standard should be based on the lower 95% confidence limit of the mean hardness value at the periodic low flow criteria as determined from a regression analysis of site-specific data. Where insufficient site-specific data exists to define the mean hardness value at the periodic low flow criteria, representative regional data shall be used to perform the regression analysis. Where a regression analysis is not appropriate, a site-specific method should be used.

Hardness data for Woods Creek near the point of discharge of the Mt. Crested Butte WWTF were insufficient to conduct a regression analysis based on the low flow. Therefore, the Division's alternative approach to calculating hardness was used, which involves computing a mean hardness.

The mean hardness was computed to be 124 mg/l based on sampling data upstream of the discharge submitted by the permittee during the development of the permit. Woods Creek flows 200 yards (0.1 mile) from the discharge point to Washington Gulch. Since there are no representative data from Woods Creek downstream of the discharge and no representative data from Washington Gulch, the hardness values upstream of the discharge submitted by the permittee were used for both stream segments. This hardness value and the formulas contained in the TVS were used to calculate the in-stream water quality standards for metals with the results shown in Table A-4a.

Table A-4a

TVS-Based Metals Water Quality Standards for CO0027171

Based on the Table Value Standards Contained in the Colorado Department of Public Health and Environment Water Quality Control Commission *Regulation 35*

Parameter	***In-Stream Water Quality Standard***			***TVS Formula: Hardness (mg/l) as CaCO3 =*** **124**
Cadmium, Dissolved	Acute	2.1	µg/l	$[1.136672-0.041838\ln(hardness)]e^{(0.9151(\ln(hardness))-3.6236)}$
	Chronic	0.5	µg/l	$[1.101672-0.041838\ln(hardness)]e^{(0.7998(\ln(hardness))-4.4451)}$
Trivalent Chromium, Dissolved	Chronic	88	µg/l	$e^{(0.819(\ln(hardness))+0.5340)}$
Hexavalent Chromium, Dissolved	Acute	16	µg/l	Numeric standards provided, formula not applicable
	Chronic	11	µg/l	Numeric standards provided, formula not applicable
Copper, Dissolved	Acute	16	µg/l	$e^{(0.9422(\ln(hardness))-1.7408)}$
	Chronic	11	µg/l	$e^{(0.8545(\ln(hardness))-1.7428)}$
Lead, Dissolved	Acute	82	µg/l	$[1.46203-0.145712\ln(hardness)][e^{(1.273(\ln(hardness))-1.46)}]$
	Chronic	3.2	µg/l	$[1.46203-0.145712\ln(hardness)][e^{(1.273(\ln(hardness))-4.705)}]$
Manganese, Dissolved	Acute	3207	µg/l	$e^{(0.3331(\ln(hardness))+6.4676)}$
	Chronic	1772	µg/l	$e^{(0.3331(\ln(hardness))+5.8743)}$
Nickel, Dissolved	Acute	562	µg/l	$e^{(0.846(\ln(hardness))+2.253)}$
	Chronic	62	µg/l	$e^{(0.846(\ln(hardness))+0.0554)}$
Selenium, Dissolved	Acute	18.4	µg/l	Numeric standards provided, formula not applicable
	Chronic	4.6	µg/l	Numeric standards provided, formula not applicable
Silver, Dissolved	Acute	2.9	µg/l	$\frac{1}{2} e^{(1.72(\ln(hardness))-6.52)}$
	Chronic	0.11	µg/l	$e^{(1.72(\ln(hardness))-10.51)}$
Zinc, Dissolved	Acute	195	µg/l	$0.978e^{(0.9094(\ln(hardness))+0.9095)}$
	Chronic	147	µg/l	$0.986\ e^{(0.9094(\ln(hardness))+0.6235)}$

The mean hardness for the Slate River was also computed to determine the standard for cadmium and zinc, due to the 303(d) listing. The mean hardness was computed to be 70 mg/l based on hardness data obtained from WQCD 151 (Slate River below Crested Butte) located approximately 3 miles downstream of the confluence with Washington Gulch. The period of record was from October 1999 through August 2005. This hardness value and the formulas contained in the TVS were used to calculate the in-stream water quality standards for cadmium and zinc with the results shown in Table A-4b.

Table A-4b
TVS-Based Metals Water Quality Standards for Slate River
Based on the Table Value Standards Contained in the Colorado Department of Public Health and Environment Water Quality Control Commission *Regulation 35*

Parameter	***In-Stream Water Quality Standard***			***TVS Formula: Hardness (mg/l) as CaCO3 =***	**70**
Cadmium, Dissolved	Acute	1.2	µg/l	$[1.136672-0.041838\ln(hardness)]e^{(0.9151(\ln(hardness))-3.6236)}$	
	Chronic	0.32	µg/l	$[1.101672-0.041838\ln(hardness)]e^{(0.7998(\ln(hardness))-4.4451)}$	
Zinc, Dissolved	Acute	116	µg/l	$0.978e^{(0.9094(\ln(hardness))+0.9095)}$	
	Chronic	88	µg/l	$0.986\ e^{(0.9094(\ln(hardness))+0.6235)}$	

<u>Total Maximum Daily Loads and Regulation 93 – Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List</u>

The two stream segments are not listed on the Division's 303(d) list of water quality impacted streams and are not on the monitoring and evaluation list.

The Washington Gulch enters the Slate River at stream segment COGUUG08, approximately 1.5 miles downstream. Stream segment COGUUG08 is on the 303(d) list of water quality impacted streams for cadmium and zinc.

For a receiving water placed on this list, the Restoration and Protection Unit is tasked with developing the Total Maximum Daily Loads (TMDLs) and the Waste Load Allocation (WLAs) to be distributed to the affected facilities. WLAs for cadmium and zinc have not yet been established and the allowable concentration calculated in the following sections may change upon further evaluation by the Division.

IV. Receiving Stream Information

<u>Low Flow Analysis</u>

The Colorado Regulations specify the use of low flow conditions when establishing water quality based effluent limitations, specifically the acute and chronic low flows. The acute low flow, referred to as 1E3, represents the one-day low flow recurring in a three-year interval, and is used in developing limitations based on an acute standard. The 7-day average low flow, 7E3, represents the seven-day average low flow recurring in a 3 year interval, and is used in developing limitations based on a Maximum Weekly Average Temperature standard (MWAT). The chronic low flow, 30E3, represents the 30-day average low flow recurring in a three-year interval, and is used in developing limitations based on a chronic standard.

Mt Crested Butte Sanitation District gathered flow data from the Washington Gulch using pygmy meter from April 2001 through August 2005. Data were not collected during the winter months from October through March due to freezing conditions and ice formation. There were no sufficient data to run the DFLOW, therefore the lowest flow for each month was used. As there are no data available for the winter months the flow data used in the previous WQA will be used for these months. According to the previous WQA, concerned citizens in the Crested Butte area took the initiative to collect flow data in both Woods Creek upstream of the Mt Crested Butte WWTP and in Washington Gulch prior to the confluence of Woods Creek. Using a 90-degree weir installed at an accessible location on Washington Gulch above the confluence with Woods Creek, stream flow measurements were conducted. These data were then used to estimate the chronic and acute low flows for each month for the Washington Gulch. For Woods Creek, flow measurements were conducted using a bucket and stop watch approach at a location on Woods Creek above the Mt Crested Butte WWTP outfall. These data were then used to estimate the chronic and acute low flows for Woods Creek. These measurements are believed to have taken place between January 1999 and December 2003. Since the flow data for Washington Gulch was collected upstream of confluence of Woods Creek, the flow of Woods Creek will be included in the Washington Gulch flow.

The local water commissioner was contacted to ensure that no additional flow measurements have been conducted for Woods Creek and Washington Gulch. The local water commissioner confirmed that the only flow data available are those collected by Mt Crested Butte SD and concerned citizens as described above.

The low flow measurements are presented in Tables A-5a and A-5b for Woods Creek and Washington Gulch, respectively.

Table A-5a

Low Flows for Woods Creek at the Mt. Crested Butte WWTF

Low Flow (cfs)	***Annual***	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***
1E3 Acute	0.07	0.07	0.07	0.07	0.07	0.07	0.13	0.08	0.07	0.07	0.07	0.07	0.07
7E3 Chronic	0.07	0.07	0.07	0.07	0.07	0.07	0.13	0.08	0.07	0.07	0.07	0.07	0.07
30E3 Chronic	0.07	0.07	0.07	0.07	0.07	0.07	0.13	0.08	0.07	0.07	0.07	0.07	0.07

The ratio of the low flow of Woods Creek to the Mt. Crested Butte SD WWTF design flow is 0.04:1.

Table A-5b Low Flows for Washington Gulch upstream of Woods Creek													
Low Flow (cfs)	***Annual***	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***
1E3 Acute	0.03	0.03	0.03	0.03	2.5	22.9	2.5	2.0	1.0	1.3	0.05	0.07	0.05
7E3 Chronic	0.03	0.03	0.03	0.03	2.5	22.9	2.5	2.0	1.0	1.3	0.05	0.07	0.05
30E3 Chronic	0.03	0.03	0.03	0.03	2.5	22.9	2.5	2.0	1.0	1.3	0.05	0.07	0.05

Table A-5b Low Flows for Washington Gulch downstream of the confluence with Woods Creek													
Low Flow (cfs)	***Annual***	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***
1E3 Acute	0.10	0.10	0.10	0.10	2.6	23	2.6	2.1	1.1	1.4	0.12	0.14	0.12
7E3 Chronic	0.10	0.10	0.10	0.10	2.6	23	2.6	2.1	1.1	1.4	0.12	0.14	0.12
30E3 Chronic	0.10	0.10	0.10	0.10	2.6	23	2.6	2.1	1.1	1.4	0.12	0.14	0.12

The ratio of the low flow of Washington Gulch to the Mt. Crested Butte WWTF design flow is 0.05:1.

Mixing Zones

The amount of the available assimilative capacity (dilution) that may be used by the permittee for the purposes of calculating the WQBELs may be limited in a permitting action based upon a mixing zone analysis or other factor. These other factors that may reduce the amount of assimilative capacity available in a permit are: presence of other dischargers in the vicinity; the presence of a water diversion downstream of the discharge (in the mixing zone); the need to provide a zone of passage for aquatic life; the likelihood of bioaccumulation of toxins in fish or wildlife; habitat considerations such as fish spawning or nursery areas; the presence of threatened and endangered species; potential for human exposure through drinking water or recreation; the possibility that aquatic life will be attracted to the effluent plume; the potential for adverse effects on groundwater; and the toxicity or persistence of the substance discharged.

Unless a facility has performed a mixing zone study during the course of the previous permit, and a decision has been made regarding the amount of the assimilative capacity that can be used by the facility, the Division assumes that the full assimilative capacity can be allocated. Note that the review of mixing study considerations, exemptions and perhaps performing a new mixing study (due to changes in low flow, change in facility design flow, channel geomorphology or other reason) is evaluated in every permit and permit renewal.

If a mixing zone study has been performed and a decision regarding the amount of available assimilative capacity has been made, the Division may calculate the water quality based effluent limitations (WQBELs) based on this available capacity. In addition, the amount of assimilative capacity may be reduced by T&E implications.

For this facility, 100% of the available assimilative capacity may be used as the facility has not had to perform a mixing zone study, the discharge is not to a T&E stream segment, and is not expected to have an influence on any of the other factors listed above.

Ambient Water Quality

The Division evaluates ambient water quality based on a variety of statistical methods as prescribed in Section 31.8(2)(a)(i) and 31.8(2)(b)(i)(B) of the *Colorado Department of Public Health and Environment Water Quality Control Commission Regulation No. 31*, and as outlined in the Division's Policy for Characterizing Ambient Water Quality for Use in Determining Water Quality Standards Based Effluent Limits (WQP-19). Ambient water quality is evaluated in this WQA analysis for use in determining assimilative capacities and in completing antidegradation reviews for pollutants of concern, where applicable.

To conduct an assessment of the ambient water quality upstream of the Mt. Crested Butte WWTF, data were gathered from WQCD 10123 (Woods Creek at Mount Crested Butte) located approximately 0.3 miles upstream from the facility. Data were available for a period of record from January 2000 through June 2006. Data for copper were collected by Mt. Crested Butte SD at Woods Creek above plant, from September 11, 2012 through January 5, 2013. Dissolved oxygen, pH, temperature, nitrate and nitrite data were available for Washington Gulch from USGS 385325106581200 (Washington Gulch below Woods Creek at Mt. Crested Butte), located just below the confluence with Woods Creek. Since there are no other ambient water quality data for Washington Gulch, the additional ambient water quality data obtained from Woods Creek will be used for Washington Gulch, since they are the same watershed, the water quality will be similar. The ambient data are summarized in Table A-6a and A-6b.

Table A-6a

Ambient Water Quality for Woods Creek

Parameter	*Number of Samples*	*15th Percentile*	*50th Percentile*	*85th Percentile*	*Mean*	*Maximum*	*Chronic Stream Standard*	*Notes*
Temp (°C)	16	2.1	9.7	12	8.1	0	NA	
DO (mg/l)	15	7.9	9	11	9.2	12	7	
pH (su)	16	6.9	8	8.1	7.7	8.4	6.5-9	
E. coli (#/100 ml)	6	2	12	25	8	33	205	1
NH_3 as N, Tot (mg/l)	16	0	0	0.068	0.02	0.08	TVS	2
As, Dis (µg/l)	11	0	0	0	0.27	3	340	2
Cd, Dis (µg/l)	16	0	0	0	0	0	0.37	2
Cu, Dis (µg/l)	14	26	42	85	56	144	11	3
Fe, Dis (µg/l)	16	46	80	135	90	190	300	
Fe, TR (µg/l)	16	175	315	4100	2136	12000	1000	
Pb, Dis (µg/l)	16	0	0	0	0	0	2.00	2
Mn, Dis (µg/l)	16	7.3	22	67	39	160	1544	
Hg, Tot (µg/l)	15	0	0	0	0	0	0.01	2
Se, Dis (µg/l)	16	0	0	0.83	0.93	11	4.6	2
Ag, Dis (µg/l)	16	0	0	0	0	0	0.053	2
Zn, Dis (µg/l)	16	0	13	15	12	34	105	2

Note 1: The calculated mean is the geometric mean. Note that for summarization purposes, the value of one was used where there was no detectable amount because the geometric mean cannot be calculated using a value equal to zero.

Note 2: When sample results were below detection levels, the value of zero was used in accordance with the Division's standard approach for summarization and averaging purposes.

Note 3: The ambient water quality exceeds the water quality standards for these parameters.

Table A-6b

Ambient Water Quality for Washington Gulch

Parameter	*Number of Samples*	*15th Percentile*	*50th Percentile*	*85th Percentile*	*Mean*	*Maximum*	*Chronic Stream Standard*
DO (mg/l)	10	7.2	8.5	9.8	8.5	10	6
pH (su)	12	7.9	8.2	11	9.2	8.4	6.5-9
Nitrate as N (mg/l)	12	0.0017	0.0035	0.016	0.0085	0.036	10
Nitrite as N (mg/l)	12	0.44	2	2.9	1.7	3.3	0.05

V. Facility Information and Pollutants Evaluated

Facility Information

The Mt. Crested Butte SD WWTF is located at in the NE 1/4 of the SE 1/4 of S26, T13S, R68W; 100 Gothic Rd, Mt. Crested Butte, CO; at latitude 38.883611° North and longitude 106.970278° West in Gunnison County. The current design capacity of the facility is 1.2 MGD (1.9 cfs). Wastewater treatment is accomplished using a mechanical wastewater treatment process. The technical analyses that follow include assessments of the assimilative capacity based on this design capacity.

An assessment of Division records indicate that there is 1 additional facility individual permit discharging to the same stream segment or other stream segments immediately upstream or downstream from this facility. Other facilities discharging to the same stream segment or other stream segments immediately upstream or downstream from this facility are covered by general permits and have limitations set at the water quality standards. These facilities were not modeled in this WQA as they have a minimal impact on the ambient water quality. The nearest discharger is:

- Town of Crested Butte WWTF (CO002040443), which discharges into the Slate River approximately 1.5 miles downstream of the confluence of Woods Creek and Washington Gulch. The discharge from Mt. Crested Butte WWTF flows approximately 0.1 mile in Woods Creek to Washington Gulch, and flows approximately 1.5 miles from the confluence of Washington Gulch and Woods Creek to the Slate River. Due to the proximity of the discharge to the Slate River, the discharge from the Town of Crested Butte WWTF was modeled in conjunction with the discharge from Mt Crested Butte WWTF, in a previous WQA for Mt. Crested Butte, to ensure that the available assimilative capacities in the Slate River for total ammonia were not exceeded. It was concluded that the discharge from the Town of Crested Butte WWTF was found to have no impact on the ammonia assimilative capacities available to the Mount Crested Butte WWTF; therefore no further combined modeling is necessary for Mt Crested Butte WWTF and Crested Butte WWTF, at this time.

The Mt. Crested Butte SD WWTF is the sole known point source contributor to Woods Creek. No other point sources were identified as dischargers to Woods Creek upstream or downstream of the confluence with Washington Gulch. Note that due to the intermittent nature of stormwater discharges, and that these types of discharges do not typically occur at low flow conditions, they are not considered in this WQA.

Pollutants of Concern

Pollutants of concern may be determined by one or more of the following: facility type; effluent characteristics and chemistry; effluent water quality data; receiving water quality; presence of federal effluent limitation guidelines; or other information. Parameters evaluated in this WQA may or may not appear in a permit with limitations or monitoring requirements, subject to other determinations such as a reasonable potential analysis, mixing zone analyses, 303(d) listings, threatened and endangered species listings or other requirement as discussed in a permit rationale.

There are no site-specific in-stream water quality standards for BOD_5 or $CBOD_5$, TSS, percent removal, and oil and grease for this receiving stream. Thus, assimilative capacities were not determined for these parameters. The applicable limitations for these pollutants can be found in Regulation No. 62 and will be applied in the permit for the WWTF.

The following parameters were identified by the Division as pollutants to be evaluated for this facility:

- Total Residual Chlorine
- *E. coli*
- Ammonia
- Temperature
- Metals and Cyanide
- Nonylphenol

It is the Division's standard procedure to consider metals and cyanide as potential pollutants of concern for all major domestic WWTFs.

According to the *Rationale for Classifications, Standards and Designations of the Gunnison and Lower Dolores River*, stream segment COGUUG13 is designated a water supply because Mount Crested Butte has a water supply intake on upper Woods Creek. This intake is upstream of the discharge. Also stream segment COGUUG09 is designated a water supply because the following entities withdraw water from this segment for domestic water supply: Town of Crested Butte (#126188) withdraws water from Sunnyside and Wildcat Creeks; Irwin Lodge (#226388) from a spring; and Mount Crested Butte (#126190) from Painter Boy Springs and (#126505) from an infiltration gallery on springs. These water sources are either located over 20 miles from the discharge or upstream of the discharge. The nearest Water Source is (#126505) from an infiltration gallery on springs, near Washington Gulch, upstream of the confluence of Washington Gulch and Woods Creek. For these reasons, the nitrate standard, which is applied at the point of intake to a water supply, is not evaluated as part of this analysis. Also, chronic dissolved manganese, sulfate and dissolved iron, which are for water supply, are not evaluated. Note that the aquatic life standard for chronic dissolved manganese does apply.

During assessment of the facility, nearby facilities, and receiving stream water quality, no additional parameters were identified as pollutants of concern.

VI. Determination of Water Quality Based Effluent Limitations (WQBELs)

<u>Technical Information</u>

Note that the WQBELs developed in the following paragraphs, are calculations of what an effluent limitation may be in a permit. The WQBELs for any given parameter, will be compared to other potential limitations (federal effluent limitations guidelines, state effluent limitations, or other applicable limitation) and typically the more stringent limit is incorporated into a permit. If the WQBEL is the more stringent limitation, incorporation into a permit is dependent upon a reasonable potential analysis.

In-stream background data and low flows evaluated in Sections II and III are used to determine the assimilative capacity of Woods Creek near the Mt. Crested Butte SD WWTF for pollutants of concern, and to calculate the WQBELs. For all parameters except ammonia, it is the Division's approach to calculate the WQBELs using the lowest of the monthly low flows (referred to as the annual low flow) as determined in the low flow analysis. For ammonia, it is the standard procedure of the Division to determine monthly WQBELs using the monthly low flows, as the regulations allow the use of seasonal flows.

The Division's standard analysis consists of steady-state, mass-balance calculations for most pollutants and modeling for pollutants such as ammonia. The mass-balance equation is used by the Division to calculate the WQBELs, and accounts for the upstream concentration of a pollutant at the existing quality, critical low flow (minimal dilution), effluent flow and the water quality standard. The mass-balance equation is expressed as:

$$M_2 = \frac{M_3 Q_3 - M_1 Q_1}{Q_2}$$

Where,

Q_1 = Upstream low flow (1E3 or 30E3)
Q_2 = Average daily effluent flow (design capacity)
Q_3 = Downstream flow ($Q_1 + Q_2$)
M_1 = In-stream background pollutant concentrations at the existing quality
M_2 = Calculated WQBEL
M_3 = Water Quality Standard, or other maximum allowable pollutant concentration

The upstream background pollutant concentrations used in the mass-balance equation will vary based on the regulatory definition of existing ambient water quality. For most pollutants, existing quality is determined to be the 85th percentile. For metals in the total or total recoverable form, existing quality is determined to be the 50th percentile. For pathogens such as fecal coliform and *E. coli*, existing quality is determined to be the geometric mean.

For temperature, the highest 7-day mean (for the chronic standard) of daily average stream temperature, over a seven consecutive day period will be used in calculations of the chronic temperature assimilative capacity, where the daily average temperature should be calculated from a minimum of three measurements spaced equally through the day. The highest 2-hour mean (for the acute standard) of stream temperature will be used in calculations of the acute temperature assimilative capacity. The highest 2-hour mean should be calculated from a minimum of 12 measurements spaced equally through the day.

Calculation of WQBELs

Using the mass-balance equation provided in the beginning of Section VI, the acute and chronic low flows set out in Section IV, ambient water quality as discussed in Section IV, and the in-stream standards shown in Section III, the WQBELs for were calculated. The data used and the resulting WQBELs, M_2, are set forth in Tables A-7a and A-7b for the Woods Creek and A-7c and A-7d for Washington Gulch.

When the ambient water quality exceeds the in-stream standard, the Division standard procedure is to allocate the water quality standard to prevent further degradation of the receiving waters. Such was the case with copper.

Chlorine: There are no point sources discharging total residual chlorine within one mile of the Mt. Crested Butte SD WWTF. Because chlorine is rapidly oxidized, in-stream levels of residual chlorine are detected only for a short distance below a source. Ambient chlorine was therefore assumed to be zero.

***E. coli*:** For *E. coli*, the Division establishes the 7-day geometric mean limit as two times the 30-day geometric mean limit and also includes maximum limits of 2,000 colonies per 100 ml (30-day geometric mean) and 4,000 colonies per 100 ml (7-day geometric mean). This 2000 colony limitation also applies to discharges to ditches.

Temperature:
A WQBEL for temperature can only be calculated if there is representative data, in the proper form, to determine what the background Maximum Weekly Average Temperature and Daily Maximum ambient temperatures are. As this data is not available at this time, the temperature limitation will be set at the water quality standard and will be revisited in the future when representative temperature data becomes available.

Cadmium and Zinc (due to 303(d) listing on the Slate River):
For cadmium and Zinc, the stream standards, the low flow and ambient water for the Slate River were used to determine the chronic WQBELs. The ambient water quality M_1, and the low flow Q_1, for the Slate River were obtained from the October 30, 2012 WQA for the Town of Crested Butte. According to the 2012 WQA, the chronic low flow for the Slate River upstream of the confluence with Washington Gulch is 9.4 cfs. Therefore Q_1 which includes the flow of Washington Gulch will be 9.5 cfs. Because the ambient water quality exceeds the standard, there is no assimilative capacity, therefore, the WQBELs are equal to the standards for cadmium and zinc. The results are presented in Table A-7e.

Table A-7a

Chronic WQBELs for Woods Creek

Parameter	***Q_1 (cfs)***	***Q_2 (cfs)***	***Q_3 (cfs)***	***M_1***	***M_3***	***M_2***	***Notes***
Temp MWAT (°C) June-Sept	0.07	1.9	1.97	NA	17	***17***	
Temp MWAT (°C) Oct-May	0.07	1.9	1.97	NA	9	***9***	
E. coli (#/100 ml)	0.07	1.9	1.97	8	126	***130***	
TRC (mg/l)	0.07	1.9	1.97	0	0.011	***0.011***	
As, TR (µg/l)	0.07	1.9	1.97	0	0.02	***0.021***	
Cd, Dis (µg/l)	0.07	1.9	1.97	0	0.5	***0.52***	
Cr+3, Dis (µg/l)	0.07	1.9	1.97	0	88	***91***	
Cr+6, Dis (µg/l)	0.07	1.9	1.97	0	11	***11***	
Cu, Dis (µg/l)	0.07	1.9	1.97	85	11	***11***	1
Fe, TR (µg/l)	0.07	1.9	1.97	315	1000	***1025***	
Pb, Dis (µg/l)	0.07	1.9	1.97	0	3.2	***3.3***	
Mn, Dis (µg/l)	0.07	1.9	1.97	67	1772	***1835***	
Mo, TR (µg/l)	0.07	1.9	1.97	0	160	***166***	
Hg, Tot (µg/l)	0.07	1.9	1.97	0	0.01	***0.01***	
Ni, Dis (µg/l)	0.07	1.9	1.97	0	62	***64***	
Se, Dis (µg/l)	0.07	1.9	1.97	0.83	4.6	***4.7***	
Ag, Dis (µg/l)	0.07	1.9	1.97	0	0.11	***0.11***	
Zn, Dis (µg/l)	0.07	1.9	1.97	15	147	***152***	
Nonylphenol (µg/l)	0.07	1.9	1.97	0	6.6	***6.8***	

Note 1: The existing water quality for this parameter exceeds the water quality standard; see the text for further discussion.

Table A-7b
Acute WQBELs for Woods Creek

Parameter	*Q_1 (cfs)*	*Q_2 (cfs)*	*Q_3 (cfs)*	*M_1*	*M_3*	*M_2*	*Notes*
Temp Daily Max (°C) June-Sept	0.07	1.9	1.97	NA	21.7	***21.7***	
Temp Daily Max (°C) Oct-May	0.07	1.9	1.97	NA	13.0	***13***	
TRC (mg/l)	0.07	1.9	1.97	0	0.019	***0.02***	
As, Dis (µg/l)	0.07	1.9	1.97	0	340	***353***	
Cd, Dis (µg/l)	0.07	1.9	1.97	0	2.1	***2.2***	
Cr+3, TR (µg/l)	0.07	1.9	1.97	0	50	***52***	
Cr+6, Dis (µg/l)	0.07	1.9	1.97	0	16	***17***	
Cu, Dis (µg/l)	0.07	1.9	1.97	85	16	***16***	1
CN, Free (µg/l)	0.07	1.9	1.97	0	5	***5.2***	
Pb, Dis (µg/l)	0.07	1.9	1.97	0	82	***85***	
Mn, Dis (µg/l)	0.07	1.9	1.97	67	3207	***3323***	
Ni, Dis (µg/l)	0.07	1.9	1.97	0	562	***583***	
Se, Dis (µg/l)	0.07	1.9	1.97	0.83	18.4	***19***	
Ag, Dis (µg/l)	0.07	1.9	1.97	0	2.9	***3***	
Zn, Dis (µg/l)	0.07	1.9	1.97	15	195	***202***	
Nonylphenol (µg/l)	0.07	1.9	1.97	0	28	***29***	

Note 1: The existing water quality for this parameter exceeds the water quality standard; see the text for further discussion.

Table A-7c

Chronic WQBELs for Washington Gulch

Parameter	Q_1 *(cfs)*	Q_2 *(cfs)*	Q_3 *(cfs)*	M_1	M_3	M_2	***Notes***
Temp MWAT (°C) June-Sept	0.1	1.9	2	NA	17	***17***	
Temp MWAT (°C) Oct-May	0.1	1.9	2	NA	9	***9***	
E. coli (#/100 ml)	0.1	1.9	2	8	126	***132***	
TRC (mg/l)	0.1	1.9	2	0	0.011	***0.012***	
As, TR (µg/l)	0.1	1.9	2	0	0.02	***0.021***	
Cd, Dis (µg/l)	0.1	1.9	2	0	0.5	***0.53***	
Cr+3, Dis (µg/l)	0.1	1.9	2	0	88	***93***	
Cr+6, Dis (µg/l)	0.1	1.9	2	0	11	***12***	
Cu, Dis (µg/l)	0.1	1.9	2	85	11	***11***	1
Fe, TR (µg/l)	0.1	1.9	2	315	1000	***1036***	
Pb, Dis (µg/l)	0.1	1.9	2	0	3.2	***3.4***	
Mn, Dis (µg/l)	0.1	1.9	2	67	1772	***1862***	
Mo, TR (µg/l)	0.1	1.9	2	0	210	***221***	
Hg, Tot (µg/l)	0.1	1.9	2	0	0.01	***0.011***	
Ni, Dis (µg/l)	0.1	1.9	2	0	62	***65***	
Se, Dis (µg/l)	0.1	1.9	2	0.83	4.6	***4.8***	
Ag, Dis (µg/l)	0.1	1.9	2	0	0.11	***0.12***	
Zn, Dis (µg/l)	0.1	1.9	2	15	147	***154***	
Nonylphenol (µg/l)	0.1	1.9	2	0	6.6	***6.9***	

Note 1: The existing water quality for this parameter exceeds the water quality standard; see the text for further discussion.

Table A-7d Acute WQBELs for Washington Gulch							
Parameter	***Q_1 (cfs)***	***Q_2 (cfs)***	***Q_3 (cfs)***	***M_1***	***M_3***	***M_2***	***Notes***
Temp Daily Max (°C) June-Sept	0.1	1.9	2	NA	21.7	***21.7***	
Temp Daily Max (°C) Oct-May	0.1	1.9	2	NA	13.0	***13***	
TRC (mg/l)	0.1	1.9	2	0	0.019	***0.02***	
As, Dis (µg/l)	0.1	1.9	2	0	340	***358***	
Cd, Dis (µg/l)	0.1	1.9	2	0	2.1	***2.2***	
Cr+3, TR (µg/l)	0.1	1.9	2	0	50	***53***	
Cr+6, Dis (µg/l)	0.1	1.9	2	0	16	***17***	
Cu, Dis (µg/l)	0.1	1.9	2	85	16	***16***	1
CN, Free (µg/l)	0.1	1.9	2	0	5	***5.3***	
Pb, Dis (µg/l)	0.1	1.9	2	0	82	***86***	
Mn, Dis (µg/l)	0.1	1.9	2	67	3207	***3372***	
Ni, Dis (µg/l)	0.1	1.9	2	0	562	***592***	
Se, Dis (µg/l)	0.1	1.9	2	0.83	18.4	***19***	
Ag, Dis (µg/l)	0.1	1.9	2	0	2.9	***3.1***	
Zn, Dis (µg/l)	0.1	1.9	2	15	195	***204***	
Nonylphenol (µg/l)	0.1	1.9	2	0	28	***29***	
Note 1: The existing water quality for this parameter exceeds the water quality standard; see the text for further discussion.							

Table A-7e Chronic WQBELs for the Slate River							
Parameter	***Q_1 (cfs)***	***Q_2 (cfs)***	***Q_3 (cfs)***	***M_1***	***M_3***	***M_2***	***Notes***
Cd, Dis (µg/l)	9.5	1.9	11.4	0.94	0.32	***0.32***	1
Zn, Dis (µg/l)	9.5	1.9	11.4	125	88	***88***	1
Note 1: The existing water quality for this parameter exceeds the water quality standard; see the text for further discussion.							

The WQBELs for Woods Creek are more stringent; therefore these limitations would apply to the discharge from the Mt. Crested Butte WWTF. For cadmium and zinc, the chronic WQBELs for the Slate River are more stringent; therefore these limitations would apply to the discharge from the Mt. Crested Butte WWTF.

Ammonia: The Ammonia Toxicity Model (AMMTOX) is a software program designed to project the downstream effects of ammonia and the ammonia assimilative capacities available to each discharger based on upstream water quality and effluent discharges. To develop data for the

AMMTOX model, an in-stream water quality study should be conducted of the upstream receiving water conditions, particularly the pH and corresponding temperature, over a period of at least one year.
Temperature and corresponding pH data sets reflecting upstream ambient receiving water conditions were available for wood Creek data from WQCD 10123. The data, reflecting a period of record from January 2000 through June 2006, were used to establish the setpoint and average headwater conditions in the AMMTOX model.

Effluent pH and temperature data were available from Mt. Crested Butte WWTF and were used to establish the average facility contributions in the AMMTOX model.

There were no pH or temperature data available for Washington Gulch that could be used as adequate input data for the AMMTOX model. Therefore, the Division standard procedure is to rely on statistically-based, regionalized data for pH and temperature compiled from similar receiving waters.

Upstream ammonia data for each month were not adequate to represent monthly ambient water quality concentrations for the AMMTOX. Thus, the mean total ammonia concentration found in Woods Creek as summarized in Table A-5 was used as an applicable upstream ammonia concentration reflective of each month.

The AMMTOX may be calibrated for a number of variables in addition to the data discussed above. The values used for the other variables in the model are listed below:

- Stream velocity = $0.3Q^{0.4d}$
- Default ammonia loss rate = 6/day
- pH amplitude was assumed to be medium
- Default times for pH maximum, temperature maximum, and time of day of occurrence
- pH rebound was set at the default value of 0.2 su per mile
- Temperature rebound was set at the default value of 0.7 degrees C per mile.

The results of the ammonia analyses for the Mt. Crested Butte SD WWTF are presented in Table A-8.

Table A-8

AMMTOX Results for Woods Creek at the Mt. Crested Butte SD WWTF

Design of 1.2 MGD (1.9cfs)

Month	*Total Ammonia Chronic (mg/l)*	*Total Ammonia Acute (mg/l)*
January	4.9	15
February	5.1	17
March	5.1	17
April	5.2	17
May	4.5	13
June	4.7	15

July	4.3	17
August	3.8	15
September	4.2	15
October	4.2	13
November	4.4	13
December	4.9	15

Note: some of the ammonia concentrations in this WQA are slightly lower than those of the previous WQA (WQA 2010), because the design flow for the facility was not converted from MGD to CFS in the 2010 AMMTOX model). This has been corrected in this WQA. Note also that the NILs provided in Table A-9 are more stringent than the new ammonia WQBELs (Table A-8) and the ammonia WQBELs of the previous WQA (previous WQA Table A-9). Therefore, these slightly lower limitations do not have any impact on the final permit limitations, because the NILs are the same as those in the previous WQA (see details in Section VII).

Whole Effluent Toxicity (WET) Testing:

The Water Quality Control Division has established the use of WET testing as a method for identifying and controlling toxic discharges from wastewater treatment facilities. WET testing is being utilized as a means to ensure that there are no discharges of pollutants "in amounts, concentrations or combinations which are harmful to the beneficial uses or toxic to humans, animals, plants, or aquatic life" as required by Section 31.11 (1) of the Basic Standards and Methodologies for Surface Waters. The requirements for WET testing are being implemented in accordance with Division policy, Implementation of the Narrative Standard for Toxicity in Discharge Permits Using Whole Effluent Toxicity (Sept 30, 2010). Note that this policy has recently been updated and the permittee should refer to this document for additional information regarding WET.

In-Stream Waste Concentration (IWC) – Where monitoring or limitations for WET are deemed appropriate by the Division, the chronic in-stream dilution is critical in determining whether acute or chronic conditions shall apply. In accordance with Division policy, for those discharges where the chronic IWC is greater than 9.1% and the receiving stream has a Class 1 Aquatic Life use or Class 2 Aquatic Life use with all of the appropriate aquatic life numeric standards, chronic conditions will normally apply. Where the chronic IWC is less than or equal to 9.1, or the stream is not classified as described above, acute conditions will normally apply. The chronic IWC is determined using the following equation:

IWC = [Facility Flow (FF)/(Stream Chronic Low Flow (annual) + FF)] X 100%

The flows and corresponding IWC for the appropriate discharge point are:

Permitted Feature	Chronic Low Flow, 30E3 (cfs)	Facility Design Flow (cfs)	IWC, (%)
001A	0.07	1.9	96

The IWC for this permit is 96 %, which represents a wastewater concentration of 4 % effluent to 96% receiving stream. This IWC correlates to chronic WET testing. The fact sheet and the permit will contain additional information regarding the type of WET testing applicable to this facility.

VII. Antidegradation Evaluation

As set out in *The Basic Standards and Methodologies for Surface Water*, Section 31.8(2)(b), an antidegradation analysis is required except in cases where the receiving water is designated as "Use Protected." Note that "Use Protected" waters are waters "that the Commission has determined do not warrant the special protection provided by the outstanding waters designation or the antidegradation review process" as set out in Section 31.8(2)(b). The antidegradation section of the regulation became effective in December 2000, and therefore antidegradation considerations are applicable to this WQA analysis.

According to the *Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins*, stream segment COGUUG13 is Undesignated. Thus, an antidegradation review is required for this segment if new or increased impacts are found to occur.

<u>Introduction to the Antidegradation Process</u>

The antidegradation process conducted as part of this water quality assessment is designed to determine if an antidegradation review is necessary and if necessary, to complete the required calculations to determine the limits that can be selected as the antidegradation-based effluent limit (ADBEL), absent further analyses that must be conducted by the facility.

As outlined in the *Antidegradation Significance Determination for New or Increased Water Quality Impacts, Procedural Guidance* (AD Guidance), the first consideration of an antidegradation evaluation is to determine if new or increased impacts are expected to occur. This is determined by a comparison of the newly calculated WQBELs verses the existing permit limitations in place as of September 30, 2000, and is described in more detail in the analysis. Note that the AD Guidance refers to the permit limitations as of September 30, 2000 as the existing limits.

If a new or increased impact is found to occur, then the next step of the antidegradation process is to go through the significance determination tests. These tests include: 1) bioaccumulative toxic pollutant test; 2) temporary impacts test; 3) dilution test (100:1 dilution at low flow) and; 4) a concentration test.

As the determination of new or increased impacts, and the bioaccumulative and concentration significance determination tests require more extensive calculations, the Division will begin the antidegradation evaluation with the dilution and temporary impact significance determination tests. These two significance tests may exempt a facility from further AD review without the additional calculations.

Note that the antidegradation requirements outlined in *The Basic Standards and Methodologies for Surface Water* specify that chronic numeric standards should be used in the antidegradation review; however, where there is only an acute standard, the acute standard should be used. The appropriate standards are used in the following antidegradation analysis.

Significance Tests for Temporary Impacts and Dilution

This is not a temporary discharge and therefore exclusion based on a temporary discharge cannot be granted and the AD evaluation must continue.

The ratio of the chronic (30E3) low flow to the design flow is 0.04:1, and is less than the 100:1 significance criteria. Therefore this facility is not exempt from an AD evaluation based on the dilution significance determination test, and the AD evaluation must continue.

For the determination of a new or increased impact and for the remaining significance determination tests, additional calculations are necessary. Therefore, at this point in the antidegradation evaluation, the Division will go back to the new or increased impacts test. If there is a new or increased impact, the last two significance tests will be evaluated.

New or Increased Impact and Non Impact Limitations (NILs)

To determine if there is a new or increased impact to the receiving water, a comparison of the new WQBEL concentrations and loadings verses the concentrations and loadings as of September 30, 2000, needs to occur. If either the new concentration or loading is greater than the September 2000 concentration or loading, then a new or increased impact is determined. If this is a new facility (commencement of discharge after September 30, 2000) it is automatically considered a new or increased impact.

Note that the AD Guidance document includes a step in the New or Increased Impact Test that calculates the Non-Impact Limit (NIL). The permittee may choose to retain a NIL if certain conditions are met, and therefore the AD evaluation for that parameter would be complete. As the NIL is typically greater than the ADBAC, and is therefore the chosen limit, the Division will typically conclude the AD evaluation after determining the NIL. Where the NILs are very stringent, or upon request of a permittee, the Division will calculate both the NIL and the AD limitation so that the limitations can be compared and the permittee can determine which of the two limits they would prefer, one which does not allow any increased impact (NIL), or the other which allows an insignificant impact (AD limit).

The non impact limit (NIL) is defined as the limit which results in no increased water quality impact (no increase in load or limit over the September 2000 load or limit). The NIL is calculated as the September 2000 loading, divided by the new design flow, and divided by a conversion factor of 8.34. If there is no change in design flow, then the NIL is equal to the September 2000 permit limitation.

If the facility was in place, but did not have a limitation for a particular parameter in the September 2000 permit, the Division may substitute an implicit limitation. Consistent with the First Update to the AD Guidance of April 2002, an implicit limit is determined based on the approach that specifies that the implicit limit is the maximum concentration of the effluent from October 1998 to September 2000, if such data is available. If this data is unavailable, the Division may substitute more recent representative data, if appropriate, on a case by case basis. Note that if there is a change in design flow, the implicit limit/loading is subject to recalculation based on the new design flow. For parameters that are undisclosed by the permittee, and unknown to the Division to be present, an implicit limitation may not be recognized.

This facility was in place as a discharger prior to September 30, 2000, and therefore the new or increased impacts test must be conducted. As the design flow of this facility has changed, the equations for the NIL calculations are shown below.

For total residual chlorine, ammonia, and *E. coli* (*E. coli* limit was calculated by multiplying the 2000 fecal coliform limit by 0.32), the limitations as of September 2000 were used in the evaluation of new or increased impacts. In accordance with the Division's practice regarding *E. coli*, an implicit limit for *E. coli* is determined as 0.32 times the permit limit for fecal coliform.

For total recoverable arsenic, dissolved cadmium, dissolved trivalent chromium, total recoverable trivalent chromium (the values for dissolved trivalent chromium were used for total recoverable trivalent chromium,), dissolved hexavalent chromium, dissolved copper, free cyanide, total recoverable iron (the values for dissolved iron were used for total recoverable iron), dissolved lead, dissolved manganese, total mercury, dissolved nickel, dissolved silver, dissolved zinc, data from June 30, 2005 to December 31, 2009 that were used as implicit NILs in the 2009 permit for this facility, were also used for this WQA.

For dissolved selenium recent data from DMR (POR 01/31/07 through 12/31/12) were used. For total recoverable molybdenum effluent result submitted during permit development, POR 10/25/12 through 01/31/13 were used.

For dissolved arsenic there are no representative effluent data available for implicit NIL; therefore, the Division will include monitoring requirements in the permit so that data can be collected in order to make such a determination of an implicit limit.

Calculation of Loadings for New or Increased Impact Test

The equations for the loading calculations are given below. Note that the AD requirements outlined in *The Basic Standards and Methodologies for Surface Water* specify that chronic numeric standards should be used in the AD review; however, where there is only an acute standard, the acute standard should be used. Thus, the chronic low flows will be used later in this AD evaluation for all parameters with a chronic standard, and the acute low flows will be used for those parameters with only an acute standard.

$$\text{Previous permit load} = M_{permitted}\ (mg/l) \times Q_{permitted}\ (mgd) \times 8.34$$
$$\text{New WQBELs load} = M_2\ (mg/l) \times Q_2\ (mgd) \times 8.34$$

Where,

$M_{permitted}$ = September 2000 permit limit (or implicit limit) **(mg/l)**
$Q_{permitted}$ = design flow as of September 2000 **(mgd)**
Q_2 = current design flow (same as used in the WQBEL calculations)
M_2 = new WQBEL concentration **(mg/l)**
8.34 = unit conversion factor

Table A-9 shows the results of these calculations and the determination of a new or increased impact.

<u>Calculation of Non-Impact Limitations</u>

The design flow of this facility as of September 30, 2000 was 0.6 MGD. The new design flow of this facility is 1.2 MGD. To determine if new or increased impacts are to occur, the September 2000 permit concentrations need to be adjusted for this new design flow. The equations are shown below.

$$\textit{September 2000 permit load} = M_{permitted} \times Q_{permitted} \times 8.34$$
$$\textit{Non Impact Limit (NIL)} = \textit{September 2000 permitted load} \div \textit{New Design Flow} \div 8.34$$

Where,

$M_{permitted}$ = September 2000 permit limit or implicit limit **(mg/l)**
$Q_{permitted}$ = September 2000 design flow **(mgd)**
Q_2 = new or current design flow **(mgd)**
8.34 = Unit conversion factor

Table A-9 shows the results of these calculations and the determination of a new or increased impact.

Table A-9 **Determination of New or Increased Impacts**						
Pollutant	***Sept 2000 Permit Limit***	***Sept 2000 Permit Load (lbs/day)***	***NIL***	***New WQBEL***	***New WQBEL Load (lbs/day)***	***New or Increased Impact***
E. coli (#/100 ml)	88	440	44	130	1301	Yes
TRC (mg/l)	0.01	0.05	0.005	0.011	0.11	Yes
$NH_{3,}$ Tot (mg/l) Jan	5.4	27	2.7	4.9	49	Yes
$NH_{3,}$ Tot (mg/l) Feb	5.0	25	2.5	5.1	51	Yes
$NH_{3,}$ Tot (mg/l) Mar	6.9	35	3.45	5.1	51	Yes
$NH_{3,}$ Tot (mg/l) Apr	9.4	47	4.7	5.2	52	Yes
$NH_{3,}$ Tot (mg/l) May	4.7	24	2.35	4.5	45	Yes
$NH_{3,}$ Tot (mg/l) Jun	3.8	19	1.9	4.7	47	Yes
$NH_{3,}$ Tot (mg/l) Jul	3.8	19	1.9	4.3	43	Yes
$NH_{3,}$ Tot (mg/l) Aug	3.2	16	1.6	3.8	38	Yes
$NH_{3,}$ Tot (mg/l) Sep	3.2	16	1.6	4.2	42	Yes
$NH_{3,}$ Tot (mg/l) Oct	3.5	18	1.75	4.2	42	Yes
$NH_{3,}$ Tot (mg/l) Nov	3.9	20	1.95	4.4	44	Yes
$NH_{3,}$ Tot (mg/l) Dec	2.6	13	1.3	4.9	49	Yes
As, TR (µg/l)	NA	NA	5	0.021	0.00021	No
As, Dis (µg/l)	NA	NA	NA	353	3.5	Yes
Cd, Dis (µg/l)	NA	NA	1.0	0.32	0.0032	No
Cr+3, TR (µg/l)*	NA	NA	200	52	0.52	No
Cr+3, Dis (µg/l)	NA	NA	200	91	0.91	No
Cr+6, Dis (µg/l)	NA	NA	200	11	0.11	No
Cu, Dis (µg/l)	NA	NA	14	11	0.11	No
CN, Free (µg/l)	NA	NA	100	5.2	0.052	No
Fe, TR (µg/l)**	NA	NA	100	1025	10	Yes
Pb, Dis (µg/l)	NA	NA	1	3.3	0.033	Yes
Mn, Dis (µg/l)	NA	NA	56	1835	18	Yes
Mo, TR (µg/l)	NA	NA	2	166	1.7	Yes
Hg, Tot (µg/l)	NA	NA	0.2	0.01	0.0001	No
Ni, Dis (µg/l)	NA	NA	2.6	64	0.64	Yes
Se, Dis (µg/l)	NA	NA	0.8	4.7	0.047	Yes
Ag, Dis (µg/l)	NA	NA	1.0	0.11	0.001	No
Zn, Dis (µg/l)	NA	NA	53	88	0.88	Yes
Nonylphenol (µg/l)	NA	NA	NA	6.84	0.07	Yes
*The values for Cr+3, Dis were used for Cr+3, TR **The values for Fe, Dis, were used for Fe, TR						

As shown in Table A-9, there are no new or increased impacts to the receiving stream based on the new WQBELS for total recoverable arsenic, dissolved cadmium, dissolved trivalent chromium, total recoverable trivalent chromium, dissolved hexavalent chromium, dissolved copper, free cyanide, total mercury, and dissolved silver, for these parameters the AD evaluation is complete and the WQBELs are the final result of this WQA.

For the other parameters there are new or increased impacts and in accordance with regulation, the permittee has the option of choosing either the NIL's or ADBAC's. Normally, the Division would assign the NILs as permit limitations, or prescribe monitoring to determine the appropriate implicit limitations as necessary, however, in the case of total recoverable iron, manganese and nickel, the NILs are very stringent compared to the WQBELs; therefore the Division will automatically calculate the ADBACs for comparison. For ammonia, because the ADBAC's are generally more stringent than NIL's, the Division assumes that the permittee will choose NIL's rather than ADBAC's. For those parameters where there is not a NIL (either implicit or explicit) the AD Guidance allows for the collection of data to determine an implicit limitation. Therefore, the permittee will be required to conduct "monitoring only" for those parameters. The permittee may request ADBAC limits. If the permittee does request ADBAC limits, the Division will proceed with the completion of this Antidegradation Analysis for rest of the parameters.

The final two significance determination tests (bioaccumulative and concentration) need to be applied, to determine if AD limits are applicable. For the bioaccumulative test, the determination of the baseline water quality (BWQ), the baseline water quality loading (BWQload), the threshold load (TL) and the threshold load concentration (TL conc) needs to occur. For the concentration test, the BWQ, significant concentration thresholds (SCT) and antidegradation based average concentrations (ADBACs) need to be calculated. These calculations are explained in the following sections, and each significance determination test will be performed as the necessary calculations are complete. The AD low flow may also need to be calculated when determining the BWQ for an existing discharger (as of Sept 2000) when upstream water quality data are used.

<u>Determination of Baseline Water Quality (BWQ)</u>

The BWQ is the ambient condition of the water quality as of September 30, 2000. The BWQ defines the baseline low flow pollutant concentration, and for bioaccumulative toxic pollutants, the baseline load. The BWQ is to take into account the influence of the discharger if the discharge was in place prior to September 30, 2000. In such a case, data from a downstream location should be used to determine the BWQ. If only upstream data is available, then a mass balance equation may be applied, using the facilities effluent data to determine the BWQ. If the discharge was not present prior to September 30, 2000, then the influence of that discharge would not be taken into account in determining the BWQ. If the BWQ has already been determined in a previous WQA AD evaluation, it may not need to be recalculated as the BWQ is the water quality as of September 30, 2000, and therefore should not change unless additional data is obtained or the calculations were in error.

The BWQ concentrations were correctly determined for manganese and nickel as part of a previous WQA (WQA 08/05/10). These are summarized in Table A-10a.

Table A-10a

BWQ Concentrations Based on Previous Determinations

Pollutant	*BWQ*	*WQS*
Mn, Dis (µg/l)	16	1772
Ni, Dis (µg/l)	0	62

Consistent with current Division procedures, the BWQ concentrations for parameters of concern should be established so that it can be used as part of an antidegradation review.

This discharger was present prior to September 30, 2000, and therefore the influence of this discharger must be evaluated in the BWQ determination. However, downstream data are not available and therefore the BWQ must be based on a combination of the effluent and upstream water quality data.

The following equation is used to determine BWQ using upstream data and the influence of the discharger:

$$BWQ = \frac{M_{eff} Q_{eff} + M_{u/s} Q_{u/s} **}{Q_{eff} + Q_{u/s}}$$

Where,

$Q_{u/s}$ = Upstream low flow during the AD period **
$M_{u/s}$ = Upstream ambient water quality during the AD period
Q_{eff} = 2-year average effluent flow
M_{eff} = 2-year average effluent pollutant concentration

** The chronic or acute low flow shall be used dependent upon whether a chronic or acute standard exists for the specific parameter. Chronic standards shall normally be used, however, if absent, the acute standard shall be used. Note that the AD low flow is discussed below.

Antidegradation Low Flow

The period of record of the data used to establish low flows during the AD evaluation generally differ from the period of record of the low flows discussed in Section IV of this analysis. However, for purposes of this analysis, the data used are the same, since they are the only data available. Thus, the low flows summarized in Section IV of this WQA will be used for $Q_{u/s}$ when establishing BWQ concentrations.

BWQ concentrations calculated using the above equation also require the determination of the ambient water quality during the antidegradation period, as well as the establishment of the facility contributions during the antidegradation review period.

Currently, it is the Division's approach to evaluate five years of ambient water quality data, if available, for the five years prior to September 30, 2000, when determining the ambient water quality during the antidegradation review period ($M_{u/s}$). The period of record for the ambient water quality data evaluated as part of the antidegradation review differ from the ambient water quality data previously set forth in Section IV. Ambient water quality data used for the antidegradation review were gathered from WQCD 10123 (Woods Creek at Mount Crested Butte) located approximately 0.3 miles upstream from the facility. Data were available at the same location as the other data, but were evaluated for a period of record from August 1999 through September 2000. These data are summarized in Table A-10b. Note that existing quality is determined as the 50th percentile for total and total recoverable metals, the geometric mean for pathogens and the 85th percentile for other pollutants.

Table A-10b

Upstream Ambient Water Quality for Woods Creek For BWQ Calculations Based upon Upstream and Effluent Data

Parameter	*Number of Samples*	*15th Percentile*	*50th Percentile*	*85th Percentile*	*Mean*	*Location*
E. coli (#/100 ml)	6	1.8	12	25	7.5	Upstream
As, Dis (µg/l)	15	0	0	0	0.2	Upstream
Fe, TR (µg/l)	15	261	480	4130	2157	Upstream
Pb, Dis (µg/l)	15	0	0	0	0	Upstream
Mn, Dis (µg/l)				16		Prev. Dtrm.
Ni, Dis (µg/l)				0		Prev. Dtrm.
Se, Dis (µg/l)	15	0	0	0	0.73	Upstream
Zn, Dis (µg/l)	15	11	13	16	12	Upstream

To establish Q_{eff} and M_{eff}, monthly average effluent concentrations as reported on the facility discharge monitoring reports were used. This data were obtained for a period of record from June 2007 through December 2012 and averaged (geometric mean for coliforms). For total recoverable iron, data were available for only 2012. The effluent quality seems to have improved in recent years resulting to lower values for total recoverable iron than the older dissolved iron data, therefore the data for dissolved iron was used in place of the recent total recoverable iron effluent data. The average concentrations for each month were then determined and were used as the M_{eff} for the respective month.

Pretreatment annual report data included analytical results for effluent monitoring for total arsenic and total recoverable arsenic. Although the forms of the metals did not agree with the pollutant evaluated in the antidegradation review, the average values from the analytical results for these metals were used for M_{eff} in the absence of other representative data for dissolved arsenic. This data is shown in Table 10c.

No data were available for nonylphenol and it was not appropriate to assume an effluent concentration equal to zero. Absent effluent data for this parameter, the Division procedures are to forgo calculations of BWQ concentrations until such time as comparable data are available. For this reason, the BWQ concentration for nonylphenol was not calculated and nonylphenol is not included in the evaluation that follows.

Table A-10c **Facility Effluent Data for the Antidegradation Period** **For BWQ Calculations Based upon Upstream and Effluent Data**			
Parameter	***# Samples or Reporting Periods***	***Ave of Monthly Ave (M_{eff})***	***Max of Daily Maxs (For estab Implicit NILs)***
E. coli (#/100 ml)	*25*	*1.2*	*11*
As, Dis (µg/l)	*10*	*2.5*	*5*
Fe, TR (µg/l)	*5*	*84*	*100*
Pb, Dis (µg/l)	*16*	*0.4*	*1.0*
Se, Dis (µg/l)	*1*	*1.6*	*1.6*
Zn, Dis (µg/l)	*31*	*48*	*120*

Pursuant to the approach discussed above, the equation for BWQ, and the available data, the BWQ concentrations for the remaining potential pollutants of concern are set forth in Table A-10d.

Note that the antidegradation requirements outlined in *The Basic Standards and Methodologies for Surface Water* specify that chronic numeric standards should be used in the AD review; however, where there is only an acute standard, the acute standard should be used. Chronic standards were available for all pollutants requiring BWQ. In the absence of ambient water quality data for molybdenum, the BWQ was assumed to be zero.

Table A-10d **BWQ Concentrations for Potential Pollutants of Concern** **Based upon Upstream and Effluent Data**						
Pollutant	***M_{eff}***	***Q_{eff} (cfs)***	***$M_{u/s}$***	***$Q_{u/s}$ (cfs)***	***BWQ***	***WQS***
E. coli (#/100 ml)	1.2	0.61	7.5	0.03	1.5	126
As, Dis (µg/l)	2.5	0.61	0.0	0.03	2.4	340
Fe, TR (µg/l)	83.8	0.61	480.0	0.03	102	1000
Pb, Dis (µg/l)	0.4	0.61	0.0	0.03	0.38	3.2
Se, Dis (µg/l)	1.6	0.61	0.0	0.03	1.5	4.6
Zn, Dis (µg/l)	48	0.61	15.9	0.03	46	149

In cases where the BWQ concentration exceeds the water quality standard, the calculated BWQ concentration must then be set equal to the water quality standard. This did not occur for any of the pollutants above.

The BWQ for Zn at the Slate River was also determined. This discharger was in place as of September 30, 2000, and therefore the BWQ will include the influence of the discharger. Data collected at WQCD 151 (Slate River below Crested Butte) located approximately 3 miles downstream of the confluence with Washington Gulch were determined to be representative of fully mixed condition downstream from the facility, and thus the data were used to determine the BWQ concentrations. Since the data were collected downstream of the discharge, it takes into account the contribution of the facility.

Currently, it is the Division's approach to evaluate five years of ambient water quality data, if available, for the five years prior to September 30, 2000, when determining the BWQ. Data from this location were available for a period of record of October 1999 through September 2000 for Zn.

Table A-10e
BWQ Concentrations for Zinc at the Slate River
Based on Downstream Ambient Water Quality Concentrations

Pollutant	***BWQ***	***WQS***
Zn, Dis (µg/l)	***59***	***88***

Bioaccumulative Significance Test

For mercury, the WQBEL have been determined to be the final result of the AD evaluation. Other parameters associated with the bioaccumulative significance test are not parameters of concern for this facility. This section is therefore omitted.

Significant Concentration Threshold

The SCT is defined as the BWQ plus 15% of the baseline available increment (BAI), and is calculated by the following equation:

$$SCT = (0.15 \times BAI) + BWQ$$

The BAI is the concentration increment between the baseline water quality and the water quality standard, expressed by the term (WQS – BWQ). Substituting this into the SCT equation results in:

$$SCT = 0.15 \times (WQS-BWQ) + BWQ$$

Where,

WQS = Chronic standard or, in the absence of a chronic standard, the acute standard
BWQ = Value from Table A-10d

For molybdenum where the BWQ was assumed to be zero, the following equation results:

$$SCT = 0.15 \times WQS$$

Determination of the Antidegradation Based Average Concentrations

Antidegradation based average concentrations (ADBACs) are determined for all parameters except ammonia, by using the mass-balance equation, and substituting the SCT in place of the water quality standard, as shown in the following equation:

$$ADBAC = \frac{SCT \times Q_3 - M_1 \times Q_1}{Q_2}$$

Where,

Q_1 = Upstream low flow (1E3 or 30E3 based on either the chronic or acute standard)
Q_2 = Current design capacity of the facility
Q_3 = Downstream flow (Q_1 + Q_2)
M_1 = Current ambient water quality concentration (From Section III)
SCT = Significant concentration threshold

The ADBACs were calculated using the SCTs, and are set forth in Table A-11a for Woods Creek and Table A-11b for the Slate River.

Table A-11a
SCTs and ADBACs for Woods Creek

Pollutant	*Q_1(cfs)*	*Q_2 (cfs)*	*Q_3 (cfs)*	*M_1*	*SCT*	*ADBAC*
E. coli (#/100 ml)	0.07	1.9	1.97	7.5	20	20
TRC (mg/l)	0.07	1.9	1.97	0	0.0017	0.0018
As, Dis (µg/l)	0.07	1.9	1.97	0	53	55
Fe, TR (µg/l)	0.07	1.9	1.97	315	237	234
Pb, Dis (µg/l)	0.07	1.9	1.97	0	0.8	0.83
Mn, Dis (µg/l)	0.07	1.9	1.97	67	279	287
Mo, TR (µg/l)	0.07	1.9	1.97	0	24	25
Ni, Dis (µg/l)	0.07	1.9	1.97	0	9.3	9.6
Se, Dis (µg/l)	0.07	1.9	1.97	0.83	2.0	2.0
Zn, Dis (µg/l)	0.07	1.9	1.97	15	61	63

Table A-11b
SCTs and ADBACs for the Slate River

Pollutant	*Q_1(cfs)*	*Q_2 (cfs)*	*Q_3 (cfs)*	*M_1*	*SCT*	*ADBAC*
Zn, Dis (µg/l)	9.5	1.9	11.4	125	63	63

Based on these calculations, the ambient water quality exceeds the SCT for total recoverable iron and zinc. Where an assimilative capacity is calculated to be less than the standard, the Division standard procedure is to allocate the water quality standard, which in this case is the SCT, to prevent degradation of the receiving stream.

Concentration Significance Tests

The concentration significance determination test considers the cumulative impact of the discharges over the baseline condition. In order to be insignificant, the new or increased discharge may not increase the actual instream concentration by more than 15% of the available increment over the baseline condition. The insignificant level is the ADBAC calculated in Table A-11 above. If the new WQBEL concentration (or potentially the TL Conc for bioaccumulatives) is greater than the ADBAC, an AD limit would be applied. This comparison is shown in Tables A-12.

Table A-12

Concentration Significance Test

Pollutant	***New WQBEL***	***ADBAC***	***Concentration Test Result***
E. coli (#/100 ml)	130	20	Significant
TRC (mg/l)	0.011	0.0018	Significant
As, Dis (µg/l)	353	55	Significant
Fe, TR (µg/l)	1025	234	Significant
Pb, Dis (µg/l)	3.3	0.83	Significant
Mn, Dis (µg/l)	1835	287	Significant
Mo, TR (µg/l)	166	25	Significant
Ni, Dis (µg/l)	64	9.6	Significant
Se, Dis (µg/l)	4.7	2	Significant
Zn, Dis (µg/l)	88	63	Significant

For all parameters above, the WQBELs are greater than the ADBACs and therefore, the concentration test results in a significance determination, and the antidegradation based effluent limitations (ADBELs) must be determined.

Antidegradation Based Effluent Limitations (ADBELs)

The ADBEL is defined as the potential limitation resulting from the AD evaluation, and may be either the ADBAC, the NIL, or may be based on the concentration associated with the threshold load concentration (for the bioaccumulative toxic pollutants). ADBACs, NILs and TLs have already been determined in the AD evaluation, and therefore to complete the evaluation, a final comparison of limitations needs to be completed.

Note that ADBACs and NILs are not applicable when the new WQBEL concentration (and loading as evaluated in the New and Increased Impacts Test) is less than the NIL concentration (and loading), or when the new WQBEL is less than the ADBAC.

Where an ADBAC or NIL applies, the permittee has the final choice between the two limitations. A NIL is applied as a 30-day average (and the acute WQBEL would also apply where applicable) while the ADBAC would be applied as a 2 year rolling average concentration. For the purposes of this WQA, the Division has made an attempt to determine whether the NIL or ADBAC will apply. The end results of this AD evaluation are in Table A-13, including any parameter that was previously exempted from further AD evaluation, with the final potential limitation identified (NIL, WQBEL or ADBAC).

Table A-13
Final Selection of WQBELs, NILs, and ADBACs

Pollutant	***NIL***	***New WQBEL***	***ADBAC***	***Chosen Limit***
E. coli (#/100 ml)	44	128	20	NIL
TRC (mg/l)	0.005	0.011	0.0017	NIL
NH3 as N, Tot (mg/l) Jan	2.7	4.9	NA	NIL
NH3 as N, Tot (mg/l) Feb	2.5	5.1	NA	NIL
NH3 as N, Tot (mg/l) Mar	3.45	5.1	NA	NIL
NH3 as N, Tot (mg/l) Apr	4.7	5.2	NA	NIL
NH3 as N, Tot (mg/l) May	2.35	4.5	NA	NIL
NH3 as N, Tot (mg/l) Jun	1.9	4.7	NA	NIL
NH3 as N, Tot (mg/l) Jul	1.9	4.3	NA	NIL
NH3 as N, Tot (mg/l) Aug	1.6	3.8	NA	NIL
NH3 as N, Tot (mg/l) Sep	1.6	4.2	NA	NIL
NH3 as N, Tot (mg/l) Oct	1.75	4.2	NA	NIL
NH3 as N, Tot (mg/l) Nov	1.95	4.4	NA	NIL
NH3 as N, Tot (mg/l) Dec	1.3	4.9	NA	NIL
As, TR (µg/l)	5	0.021	NA	WQBEL
As, Dis (µg/l)	NA	353	55	ADBAC
Cd, Dis (µg/l)	1	0.32	NA	WQBEL
Cr+3, TR (µg/l)	200	52	NA	WQBEL
Cr+3, Dis (µg/l)	200	91	NA	WQBEL
Cr+6, Dis (µg/l)	200	11	NA	WQBEL
Cu, Dis (µg/l)	14	11	NA	WQBEL
CN, Free (µg/l)	100	5.2	NA	WQBEL
Fe, TR (µg/l)	100	1025	234	ADBAC
Pb, Dis (µg/l)	1.0	3.3	0.83	NIL
Mn, Dis (µg/l)	56	1835	287	ADBAC
Mo, TR (µg/l)	2	166	25	ADBAC
Hg, Tot (µg/l)	0.2	0.01	NA	WQBEL
Ni, Dis (µg/l)	2.6	64	9.6	ADBAC
Se, Dis (µg/l)	0.8	4.7	2	ADBAC
Ag, Dis (µg/l)	1.0	0.11	NA	WQBEL
Zn, Dis (µg/l)	53	88	63	ADBAC

For the following parameters, *E. Coli*, TRC, ammonia, and dissolved lead, the NILs have been established for this facility. The NILs were selected as they are less stringent than the ADBACs. However, the facility has the final choice between the NILs and ADBACs, and if the ADBAC is preferred, the permit writer should be contacted.

For the following parameters, dissolved arsenic, total recoverable iron, dissolved manganese, total recoverable molybdenum, dissolved nickel, dissolved selenium, and dissolved zinc, the ADBACs have been established for this facility. The ADBACs were selected as they are less stringent than the NILs, or perhaps due to the application as a two-year rolling average. However, the facility has the final choice between the NILs and ADBACs, and if the ADBAC is preferred, the permit writer should be contacted.

Alternatives Analysis

If the permittee does not want to accept an effluent limitation that results in no increased impact (NIL) or in insignificant degradation (ADBAC), the applicant may conduct an alternatives analysis (AA). The AA examines alternatives that may result in no degradation or less degradation, and are economically, environmentally, and technologically reasonable. If the proposed activity is determined to be important economic or social development, a determination shall be made whether the degradation that would result from such regulated activity is necessary to accommodate that development. The result of an AA may be an alternate limitation between the ADBEL and the WQBEL, and therefore the ADBEL would not being applied. This option can be further explored with the Division. See Regulation 31.8 (3)(d), and the Antidegradation Guidance for more information regarding an alternatives analysis.

VIII. Technology Based Limitations

Federal Effluent Limitation Guidelines

The Federal Effluent Limitation Guidelines for domestic wastewater treatment facilities are the secondary treatment standards. These standards have been adopted into, and are applied out of, Regulation 62, the Regulations for Effluent Limitations.

Regulations for Effluent Limitations

Regulation No. 62, the Regulations for Effluent Limitations, includes effluent limitations that apply to all discharges of wastewater to State waters, with the exception of storm water and agricultural return flows. These regulations are applicable to the discharge from the proposed discharge.

Table A-14 contains a summary of the applicable limitations for pollutants of concern at this facility.

Table A-14

Regulation 62 Based Limitations

Parameter	***30-Day Average***	***7-Day Average***	***Instantaneous Maximum***
BOD_5	30 mg/l	45 mg/l	NA
BOD_5 Percent Removal	85%	NA	NA
TSS, mechanical plant	30 mg/l	45 mg/l	NA
TSS Percent Removal	85%	NA	NA
Total Residual Chlorine	NA	NA	0.5 mg/l
pH	NA	NA	6.0-9.0 s.u.
Oil and Grease	NA	NA	10 mg/l

IX. References

Regulations:

The Basic Standards and Methodologies for Surface Water, Regulation 31, Colorado Department Public Health and Environment, Water Quality Control Commission, effective January 31, 2013.

Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins, Regulation No. 35, Colorado Department Public Health and Environment, Water Quality Control Commission, effective March 30, 2013.

Colorado River Salinity Standards, Regulation 39, CDPHE, WQCC (last update effective 8/30/97)

Regulations for Effluent Limitations, Regulation 62, CDPHE, WQCC, July 30, 2012.

Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List, Regulation 93, Colorado Department Public Health and Environment, Water Quality Control Commission, effective March 30, 2012.

Policy and Guidance Documents:

Antidegradation Significance Determination for New or Increased Water Quality Impacts, Procedural Guidance, Colorado Department Public Health and Environment, Water Quality Control Division, December 2001.

Memorandum Re: First Update to (Antidegradation) Guidance Version 1.0, Colorado Department Public Health and Environment, Water Quality Control Division, April 23, 2002.

Rationale for Classifications, Standards and Designations of Segments of the Gunnison and Lower Dolores River, Colorado Department Public Health and Environment, Water Quality Control Division, effective March 30, 2013.

Policy Concerning Escherichia coli versus Fecal Coliform, CDPHE, WQCD, July 20, 2005.

Colorado Mixing Zone Implementation Guidance, Colorado Department Public Health and Environment, Water Quality Control Division, effective April 2002.

Policy for Conducting Assessments for Implementation of Temperature Standards in Discharge Permits, Colorado Department Public Health and Environment, Water Quality Control Division Policy Number WQP-23, effective July 3, 2008.

Implementing Narrative Standards in Discharge Permits for the Protection of Irrigated Crops, Colorado Department Public Health and Environment, Water Quality Control Division Policy Number WQP-24, effective March 10, 2008.

Policy for Characterizing Ambient Water Quality for Use in Determining Water Quality Standards Based Effluent Limits, Colorado Department Public Health and Environment, Water Quality Control Division Policy Number WQP-19, effective May 2002.